

REPORT OF A CASE OF STAB-WOUND OF THE
PERICARDIUM, TERMINATING IN RECOVERY
AFTER RESECTION OF A RIB AND
SUTURE OF THE PERICAR-
DIUM.¹

By H. C. DALTON, M.D.,

OF ST. LOUIS,

PROFESSOR OF ABDOMINAL AND CLINICAL SURGERY IN THE MARION-SIMS
COLLEGE OF MEDICINE.

THE caption of this paper would give a better idea of its contents had I given it the title of Stab-Wounds of the Thorax; for, in addition to the history of the case of pericardial injury, I discuss thoracic stab-wounds in general.

Eugene L., aged twenty-two, entered the City Hospital, September 6, 1891, with the following history:

One hour before admission, while engaged in a fight, he was cut in the left breast, the injury being followed by a feeling of faintness and nausea. When admitted to the hospital, a wound half an inch in length was found an inch and a half above the left nipple. There was little haemorrhage from the wound. Percussion showed normal cardiac dulness. The percussion of chest showed absence of dulness.

The wound was cleaned and a dressing of antiseptic gauze applied. Temperature was 99.5° F., pulse 110, respiration 28.

Ten hours after admission to the hospital temperature was 101° F., pulse 112, respiration 40. Percussion now gave dulness over entire left side; respiration was superficial. The patient complained of considerable pain.

He was taken to the amphitheatre and the dressing removed.

¹ Read at the Mississippi Valley Medical Association Meeting at Hot Springs, Ark., November 23, 1894.

As soon as this was done, blood and air gushed from the wound with each respiration.

An incision eight inches in length was made over and parallel to the fourth rib, and *six* inches of the rib resected.

The bleeding intercostal artery was tied. The pleural cavity was full of clotted and fluid blood, which, with each inspiration, gushed from the large wound with alarming force. By turning the patient on the left side, and using a long pair of forceps armed with a sponge, I was enabled to remove the blood from the pleural cavity.

The patient was turned upon his back, and by the aid of strong retractors a transverse wound of the pericardium, *two* inches in length, was revealed. At the inner angle of the wound the pericardium was penetrated to the extent of half an inch. The balance of the wound failed to penetrate the cavity.

By the use of two pairs of long forceps I was enabled to grasp the pericardium a little beyond each angle of the wound and draw it fairly well up to the surgical wound. Of course the pericardium would rise and fall with each pulsation of the heart.

With a long needle-holder, armed with a sharply-curved needle and catgut, I was able, with very great difficulty, to close the pericardial wound by continuous suture.

Great difficulty was experienced in following the up-and-down movements of the pericardium, caused by the heart pulsations.

After many attempts, I finally succeeded in closing the wound. The pleural cavity was thoroughly irrigated with hot sterilized water, the surgical wound closed, and an antiseptic dressing applied, over which was placed a cotton bandage, followed by a wet crinoline bandage; the latter being firmly applied. No drainage was used.

At the end of operation, which consumed an hour, the pulse was 140, respiration 60.

During the operation the respiration was 60 and very labored, the pulse 140. One hour thereafter the pulse was 100, temperature 99° F., respiration 28.

At several stages of the operation the patient seemed to be dying; hypodermic injections of whiskey and strychnine were then employed.

Before closing the pericardial wound I inserted the index finger, but could not discover that the knife penetrated the heart. There did not seem to be an unusual amount of fluid in the pericardium, hence I did not believe that it contained blood; however, no extended

examination was made in this direction, as the patient's condition was so grave as to necessitate the completion of the operation at the earliest possible moment. The pericardial wound was not bleeding.

The patient made an uninterrupted, rapid recovery. In fact, there was little of interest to record in the subsequent history of the case.

With the exception of three other cases, my experience in operating for stab-wounds has been confined to the abdomen.

When such wounds penetrate the abdominal cavity, we would be inexcusable, aye, criminally negligent, did we not enlarge the opening and *see*, not guess at, the existing condition. But in stab-wounds of the thorax we would not be justified in opening the cavity without the supervention of grave symptoms, such as haemorrhage, dyspnoea, rapid pulse, etc.

The presence of haemorrhage can be readily determined by percussion.

It must not be forgotten, however, that, like the peritoneum, the pleura can take care of a good deal of blood; therefore, unless other grave conditions arise, operative interference would not be indicated.

In my experience at the City Hospital, I saw a number of cases in which almost the entire pleural cavity was filled with blood after gun-shot, stab-, or other wounds, the patients recovering without operation.

In stab-wounds of the thorax, the rule of non-interference, without grave symptoms, would not hold good, if such injuries be low down. Here we may have the knife-blade passing through the diaphragm and wounding abdominal viscera; for, as all know, such injuries may exist with few, if any, grave symptoms.

In such cases it would be the part of wisdom to resect a rib, and thoroughly inspect the contiguous diaphragmatic surface. This we can readily do, anteriorly and laterally; but, I imagine, we would experience great difficulty should the wound be in the back.

Should peritoneal penetration be established, we should make a two-inch incision, an inch below the costal border. This

would enable us to remove and inspect the viscera in the vicinity of the wound. Should the blade penetrate the convex surface of the liver, the better procedure would be to enlarge the diaphragmatic opening and sew up the hepatic wound.

As I have pointed out in several papers, in closing wounds of the liver it is necessary to use a sharply-curved needle armed with heavy catgut, taking care to enter the needle an inch from the edge of the wound, passing it in as deeply as possible, and bringing it out an equal distance on the opposite side. In tying the catgut, it is very important not to tie it too tight, simply tightening it sufficiently to bring the lips of the wound in apposition. Tying the suture too firmly would, of course, result in cutting through the very friable liver tissue.

In the *Journal of the American Medical Association*, November 15, 1890, will be found the report of a case in which I did this operation successfully. In addition to the hepatic wound, the patient received a stab-wound of the ileum, which was closed in the usual manner.

In the *Medical Mirror*, the date of which I do not now recall, will also be found a report of a case where I followed this rule in dealing with a wound on the left side. In this case the knife-blade passed through the thorax, diaphragm, and into the spleen. The resection of the rib in this case revealed omentum protruding through the diaphragm. An incision four inches long, an inch below the costal border, disclosed a wound of the spleen, which was closed with catgut suture. Both of these patients recovered.

This case, with its treatment, seems to me to present several important and interesting features, and I believe that some useful lessons may be drawn from it.

Regarding the case of penetrating stab-wound of the pericardium, we are struck with the absence of what are usually considered classical symptoms. There was no cough, no dyspnoea, no increase of cardiac dulness over the lung. Shock was moderate or altogether absent; temperature was slightly elevated, and pulse was accelerated; both facts might have been accounted for by the excitement and late violent exertion of the patient.

The severe hæmorrhage from the fourth intercostal artery came on several hours after the injury, and then we find the temperature, pulse, and respiration all increased.

The bleeding vessel was easily caught and tied, after removal of a considerable portion of the rib.

Just here the question of selection of method for control of such a hæmorrhage might come up. This might have been possible by packing, by compresses, by ligature thrown around the rib, or by a combination of these methods. But the chest cavity was filled with blood, and the patient in imminent danger from that source, as well as from a continuation of the bleeding. Then, too, we did not know that the bleeding came from the severed artery alone.

This fact was made our warrant for a large opening through which the effused blood could be removed and pressure upon the lung and heart relieved. This object was easily and rapidly accomplished.

It was at this point in the operation that the wound in the pericardium came into view and demanded its share of attention. I might have let it alone, and trusted to Providence, luck, or adhesions to shut it off from the injured pleural cavity, and prevent its possible infection by that route. But adhesions are at best uncertain, and an adherent pericardium is usually uncomfortable.

I had no precedent to guide me, no authority to uphold me in attempting to sew up this wound over a heart that was beating at the rate of 140 per minute. However, I thought then, and still think, that my patient had a better chance for recovery after the wound was closed. Not only this, but I am sure that his chances for complete restoration of the cardiac functions were a great deal better than they would have been if his wound had been allowed to take its own course, and had fastened itself to the first organ that presented.

Medical literature seems to be singularly barren upon this particular form of injury. Most of the standard text-books dismiss the subject of wounds of the pericardium with a line or two, merely saying that such wounds are usually followed by pericarditis. Yet I doubt if these injuries are so rare or so unimportant as this would seem to imply.

In my own case a few points seem worthy of further remark. When first seen (an hour after the injury was received) no evidence of severe haemorrhage was noted. It was ten hours later before decided symptoms of trouble, enabling us to make a positive diagnosis of a penetrating wound of the chest, developed.

The wisdom of closing the pericardial wound may be open to question. The considerations which led me to adopt that course were dangers of infections from the pleural cavity, and prevention of adhesions either to heart-wall or pulmonary pleura. The result seems fully to justify the rather difficult and prolonged manipulation.

Without such closure I think the patient *might* have recovered, but certainly his chances for complete recovery without a crippled heart were vastly improved by immediate and aseptic suture of the pericardial wound.